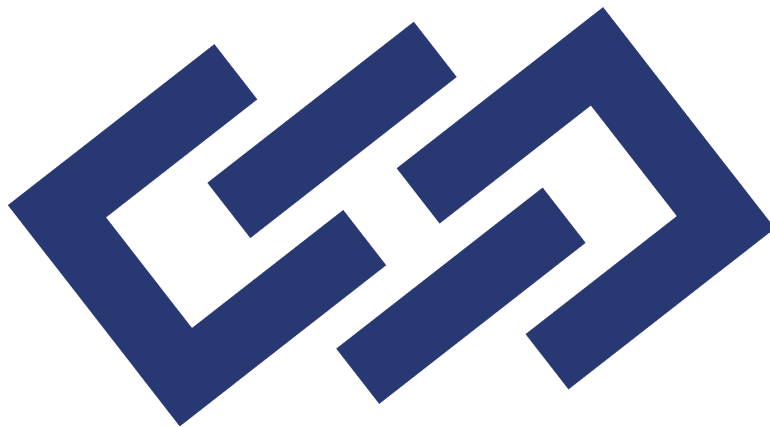


WORKFLOW OF EXPORTING REVIT MODELS TO UNITY



PENN STATE

COMPUTER INTEGRATED
CONSTRUCTION

NOTE:

THIS WORKFLOW IS FOR USERS WHO USE REVIT 2016 AND ABOVE,
AND 3DS MAX 2016 AND ABOVE. THE WORKFLOW DOCUMENTED WILL
ALSO WORK FOR OLDER VERSIONS, BUT MAY NOT YIELD BEST RESULTS.



Export Your Model from Revit

1. Load your Revit model. Always open your revit model through the “Open...” (open project) from inside Revit, because it allows detaching the model from central file. In the open project dialog, select “Detach from Central” if you are opening a central file. Click Open, then select “Detach and discard worksets” in the pop up window. See Figure 1

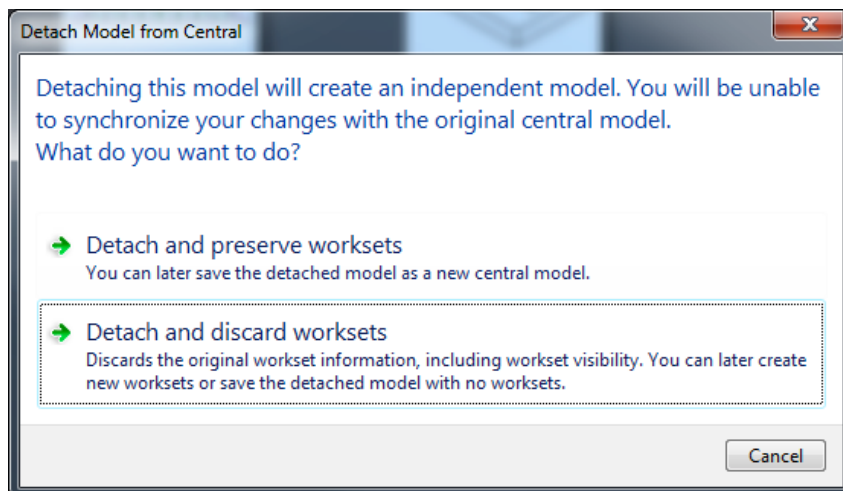
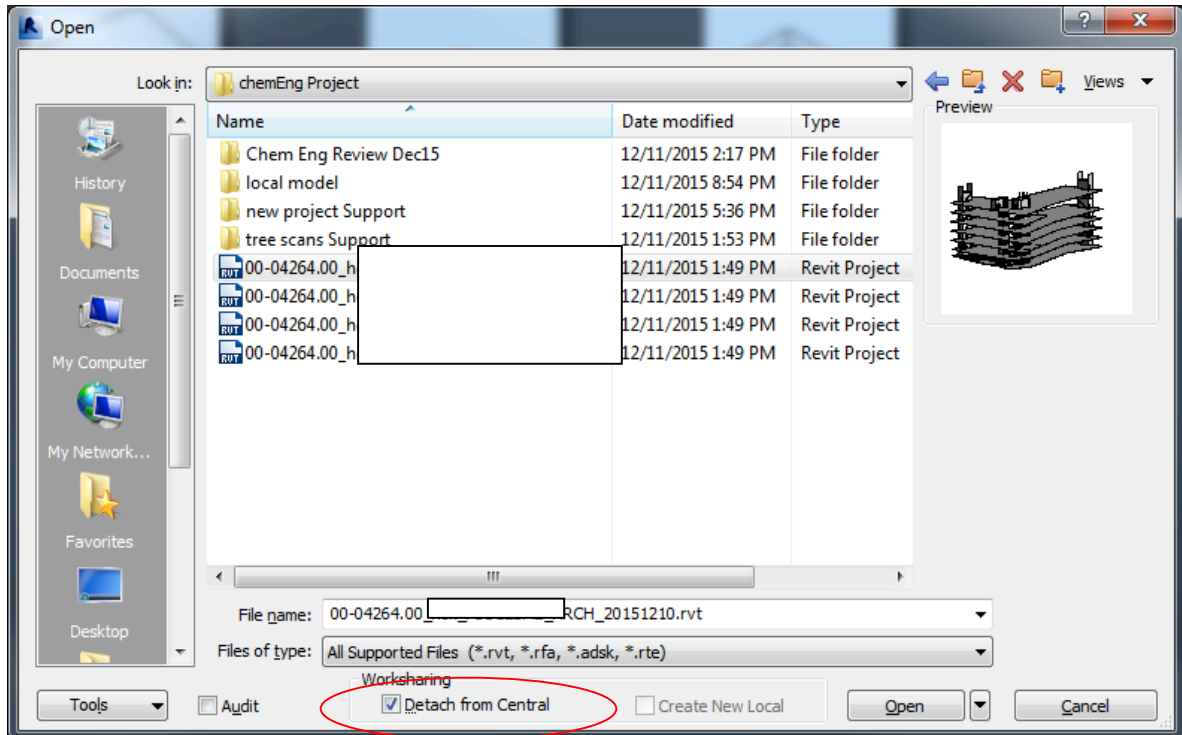


FIGURE 1 OPEN REVIT FILE



2. Go to the home 3D view. This can be accessed by clicking the “House” button at the quick access bar at the top of the application. Set the Level of Detail to Fine and Visual Style to Realistic in the bottom toolbar of the selected 3D view to export. See Figure 2.

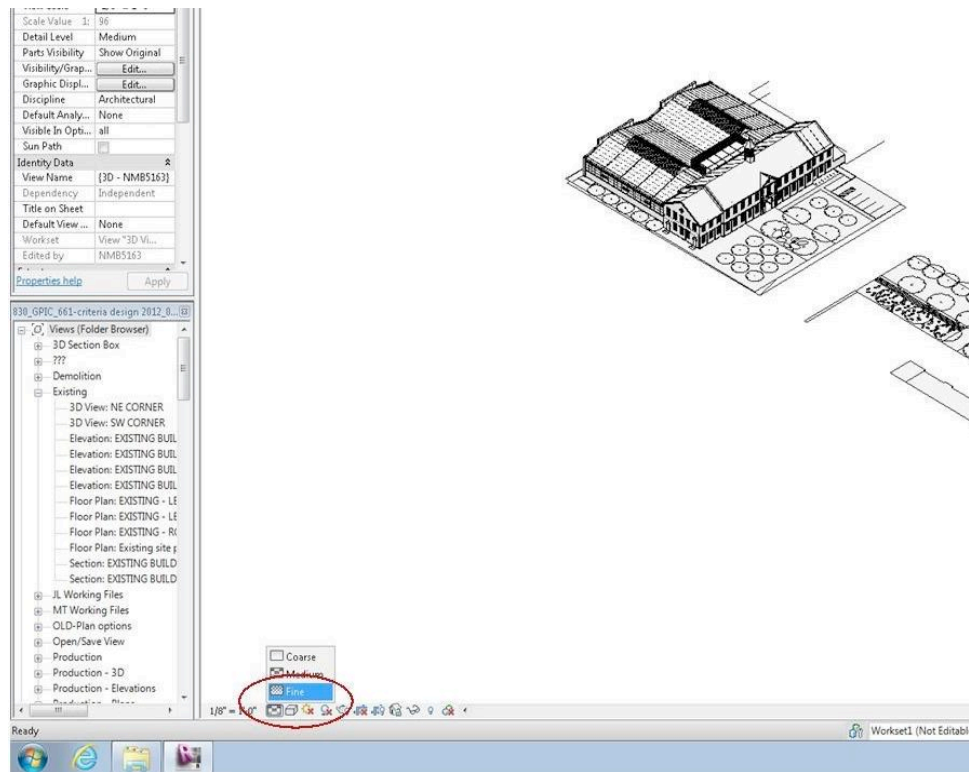


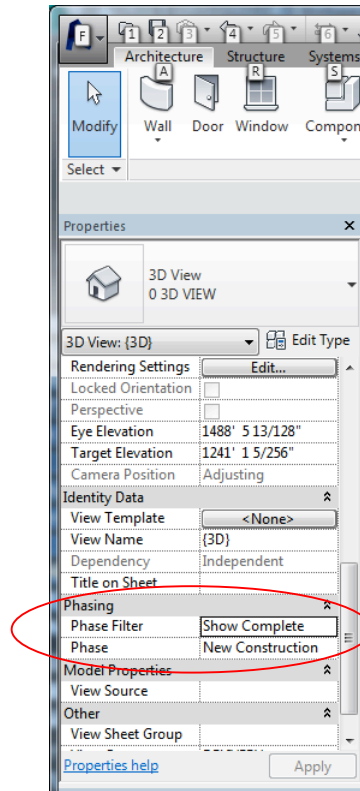
FIGURE 2: SETTING THE LEVEL OF DETAIL TO FINE IN REVIT’S 3D VIEW

3. It is important to note that objects hidden in view will not be exported. You need to be careful and verify everything you want is visible in view, and hide everything you don’t want.



To show everything you want correctly, check the following:

- a. Check the Phasing in your view property. Recommend setting to your latest phase and set the phase filter to “Show Complete”. See figure below:



- b. Click the review hidden element at the bottom of Revit, which will bring you to a view that shows all the invisible elements. See figure below:



- c. Press “VV” or “VG” to bring up the Visibility and Graphic dialog, which allows you to show or hide Revit elements by model category.

To hide any element, just select the element, and right click, select Hide in View, which allows you to hide by element or category.

4. Now remember the name of your view (Typically {3D} by default) and save your revit file.



IMPORT YOUR MODEL INTO 3D STUDIO MAX (3DS MAX)

1. Open 3D Studio Max.
2. Click on the “M” (3D Studio Max 2013 or later) icon in the top left-hand corner of the screen, click Import.

Note: click import in the first level of menu. Our test on Max 2016 shows this way imports the most efficient model with significant lower polygon count. Linking revit/FBX model may result in wrong scale and much more polygon. However the benefit is that linking revit/FBX won't lose any model elements, whereas we have seen occasions where direct import lost some model elements.

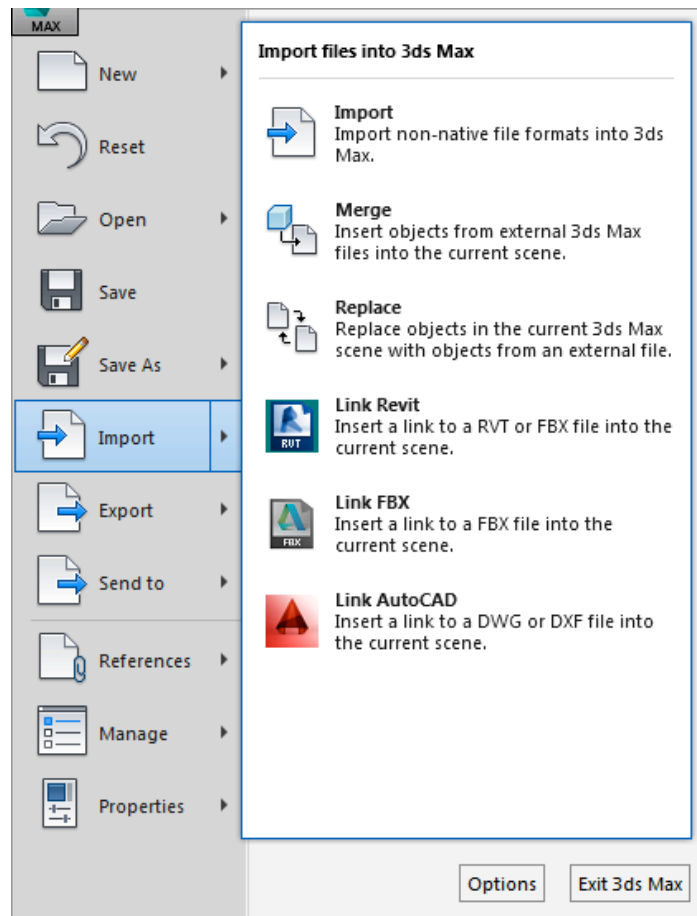
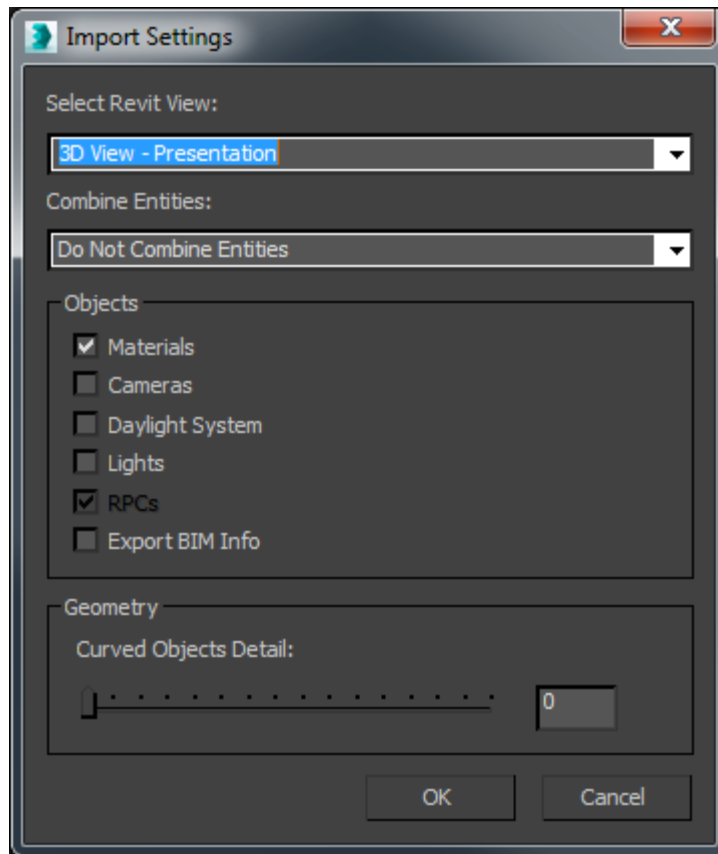


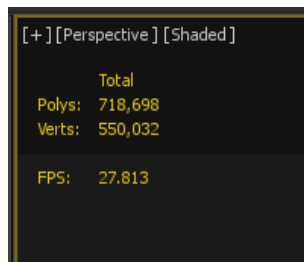
FIGURE 2: LINKING A FILE INTO 3D STUDIO MAX MENU OPTION



3. For most polygon efficient model, set the Import setting as Figure below. The revit view selected should be {3D} if you did not save your revit 3d view to another name.



When finish importing, press 7 to view the polygon count of the model. Generally on a decent computer, a model with less than 5 million polygon is considered OK. Exceeding that we recommend breaking down the model into smaller parts and reimport, or perform heavy polygon reduction.



4. Usually the textures in Revit model will not show up in 3ds max viewport by default. This is because the material from Revit model is a special type of material that is different from the materials commonly used in 3ds max. Virtual reality software usually only read the standard material of 3ds max, which is why the Revit materials do not come across into the virtual reality software. To convert the Revit material to 3ds max standard material, we need to use a maxscript called "Autodesk Material Convert"(AMC) (<http://www.3dstudio.nl/webshop/category/14-3dstudio>), which is not free to use. The AMC is very easy to use. A quick demo of the workflow can be found here: <http://vimeo.com/49507833>

5. There is a manual way of applying all the textures in Unity, which I will discuss in the Unity session.

6. [Optional] Now if you want to see how many materials are in your Revit model, you can press "m" on your keyboard. In the slate material editor, click material --> get all scene materials. You will see a tree of material boxes in the view tab. Find the bitmap nodes, and you can see if they have textures loaded in bitmap. See Figure below.

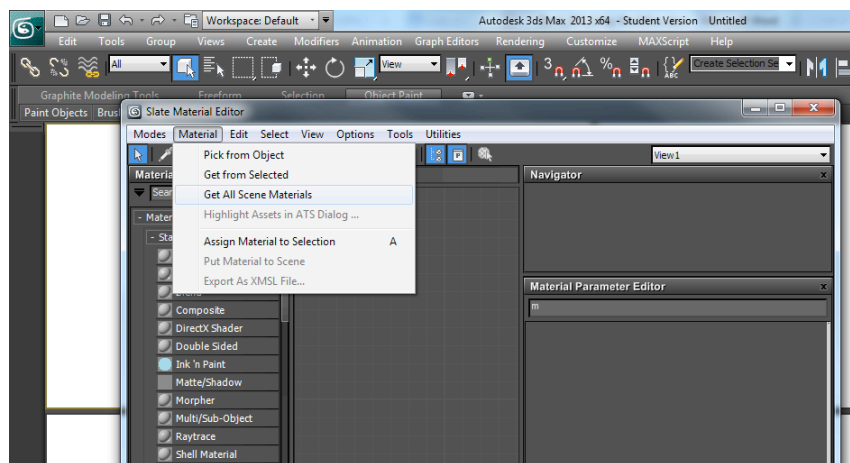


FIGURE 3 SEE ALL MATERIALS IN YOUR MODEL

7. Model Optimization:

- a) You can press 7 on keyboard to see the number of polygon and vertices your model has
- b) A quick way to reduce the polygon of your Revit model is to convert your Revit model to editable poly. Group your entire Revit model → select your building → right click → convert to editable poly → ungroup your building. This will significantly reduce the number of polygon of your model. However, take caution when converting curved surface, such as tanks, columns, vessels,



etc., because you may get unpredictable results that are very different from the original shape.

- c) Other ways to reduce polygon includes using “Prooptimizer” and “MultiRes” modifier. To apply a modifier to an object, select it first, and on the right side modifier tab, select the prooptimizer or multires modifier in the modifier list (see figure below on the left). Please google those modifier on details of using them. They are very easy to use. After setting up the modifier, the last step is to collapse the modifier into the Mesh, which can be thought as replacing the original element mesh with the optimized one. To do this, select your objects, go to the Utilities tab (see figure below on the right) → click Collapse → output type set to Modifier Stack Result → collapse selected. Note this step is non reversible.

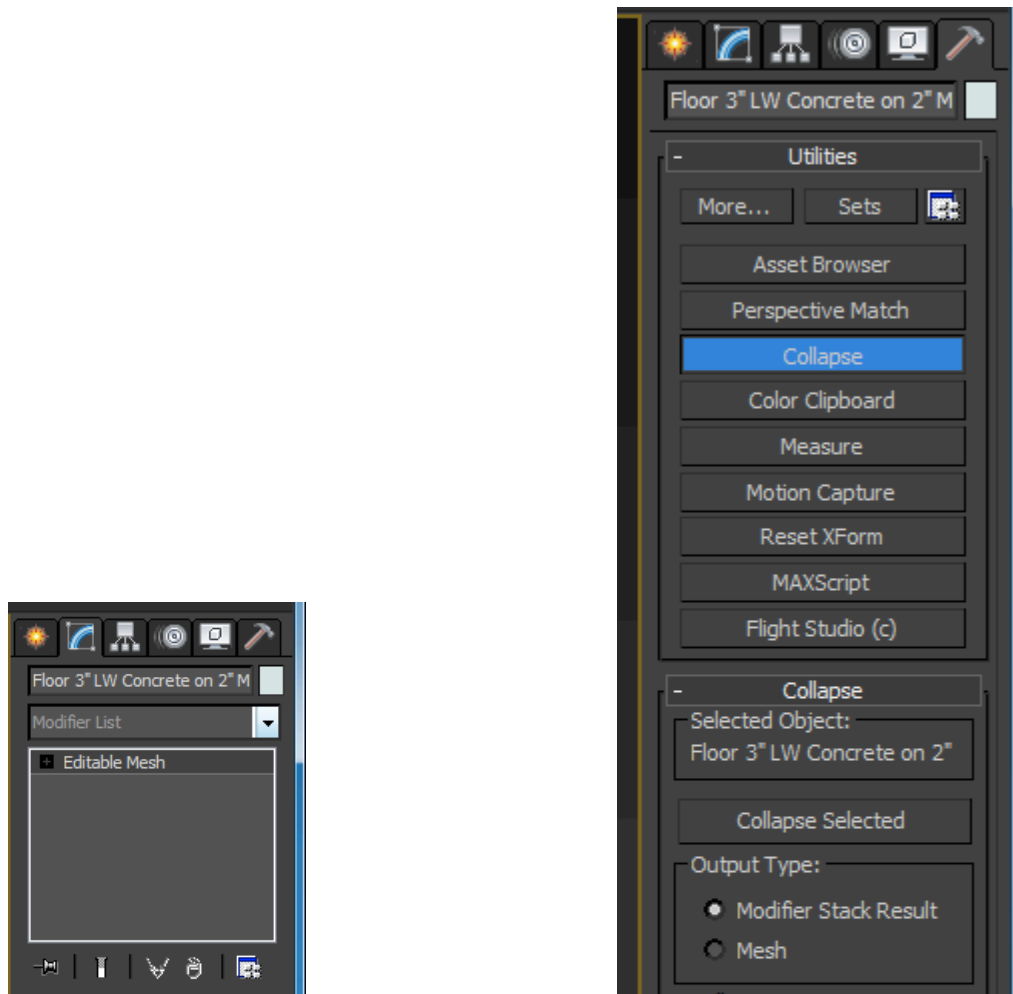


FIGURE 15 MODIFIER AND COLLAPSE TOOLS



EXPORT YOUR MODEL FROM 3DS MAX

1. Click on the “M” or similar icon in the top left-hand corner of the screen. Scroll down to export and then scroll over to Export as shown in Figure 16.

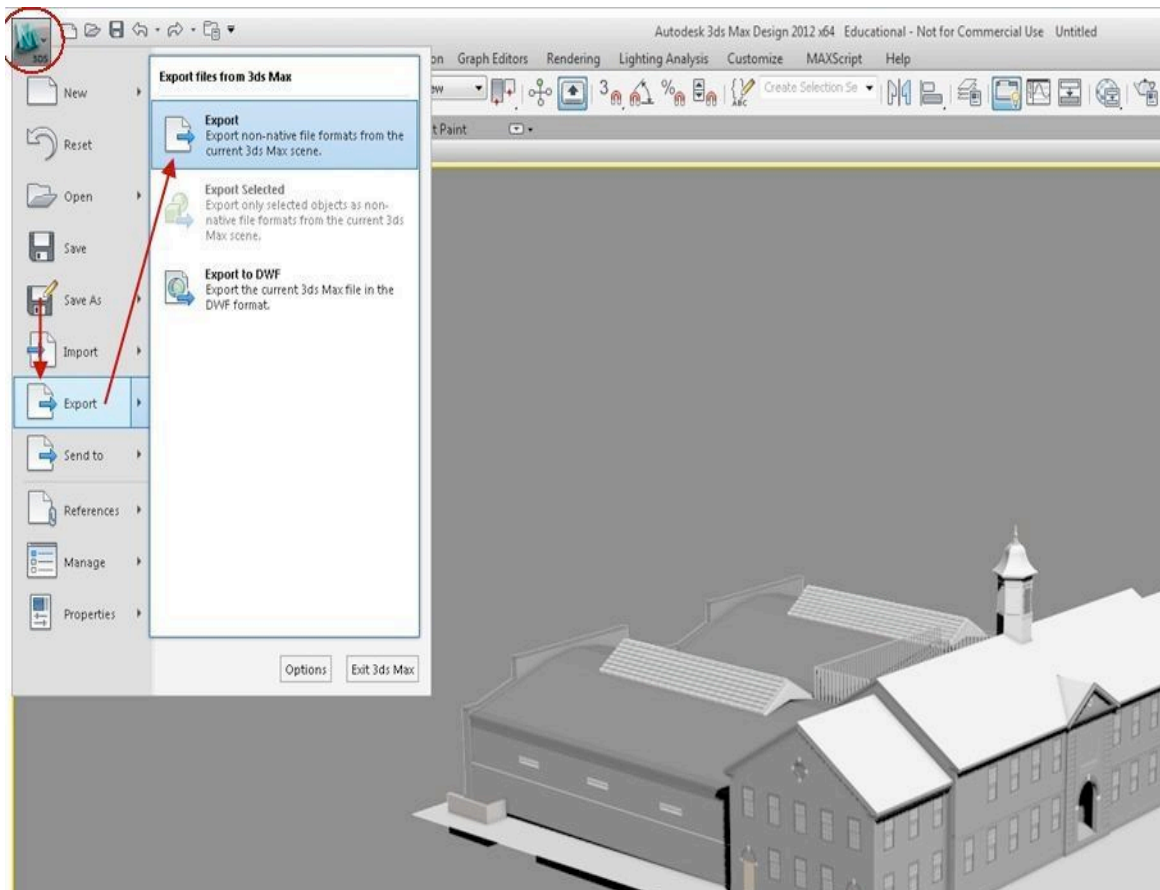


FIGURE 4: MENU NAVIGATION FOR EXPORTING A MODEL

2. Name the file, select .FBX from the File Type drop down menu, and save the file. It is recommended that the file be exported to a dedicated folder for FBX files from 3ds max.



3. Change the FBX file units to centimeter in the Advanced Options and Units tabs of the FBX Export screen as seen in Figure 17.

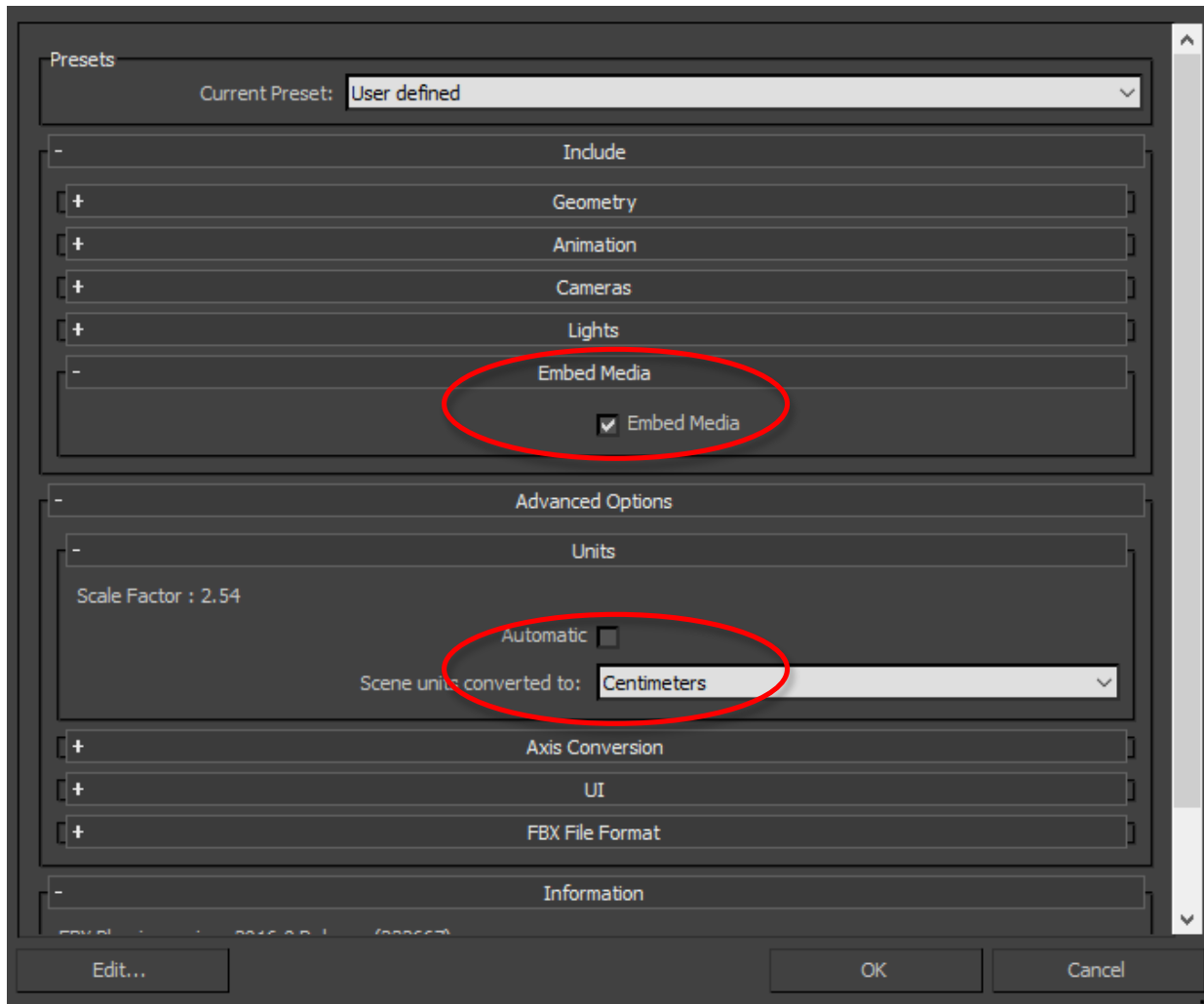


FIGURE 5: CHANGING THE FBX FILE UNITS TO CENTIMETERS

4. Check the Embed Media so that the exported FBX file contains textures.
5. Click OK and model will export the FBX file.



IMPORT YOUR MODEL INTO UNITY

1. Open Unity

- a. Open Project-Select a project if any are listed. If not or the one you are looking for is not there, click Open Other... and find a project to open. Then, click Open as shown in Figure 18.

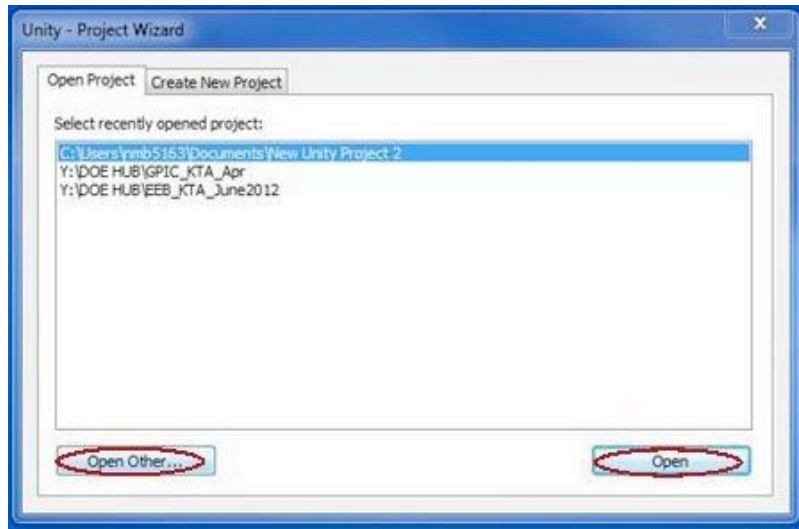


FIGURE 6: OPENING A SAVED UNITY PROJECT

- b. New Project-Scroll through the Unity Package list and import the following by checking the boxes to their left: Character Controller, Skyboxes, and Terrain Assets as shown in Figure 19.

2. Click Create.

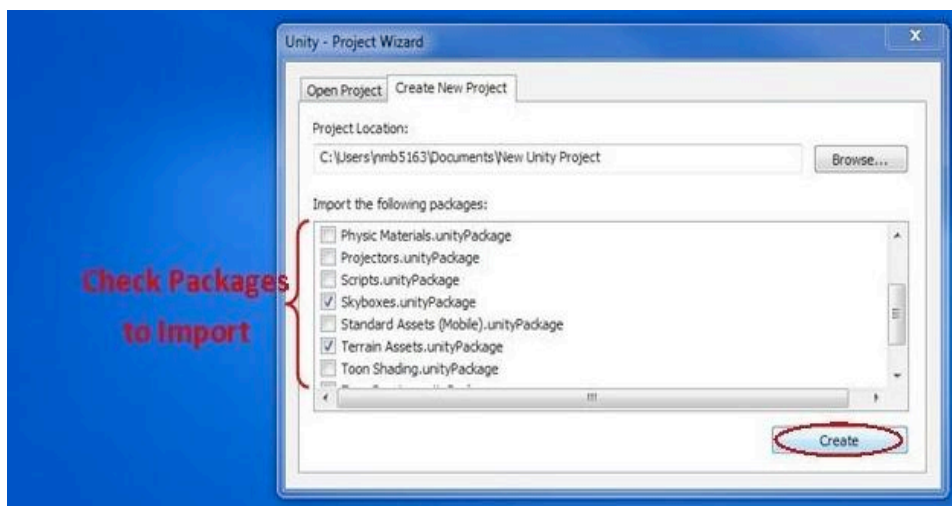


FIGURE 7: SELECTING UNITY PACKAGES TO IMPORT TO START A NEW PROJECT

3. Unity will open with either the saved project you load or the new project you created.
4. Click on the Assets menu in the top toolbar.
5. Click Import New Asset... from the Assets drop down menu as shown in Figure 20.

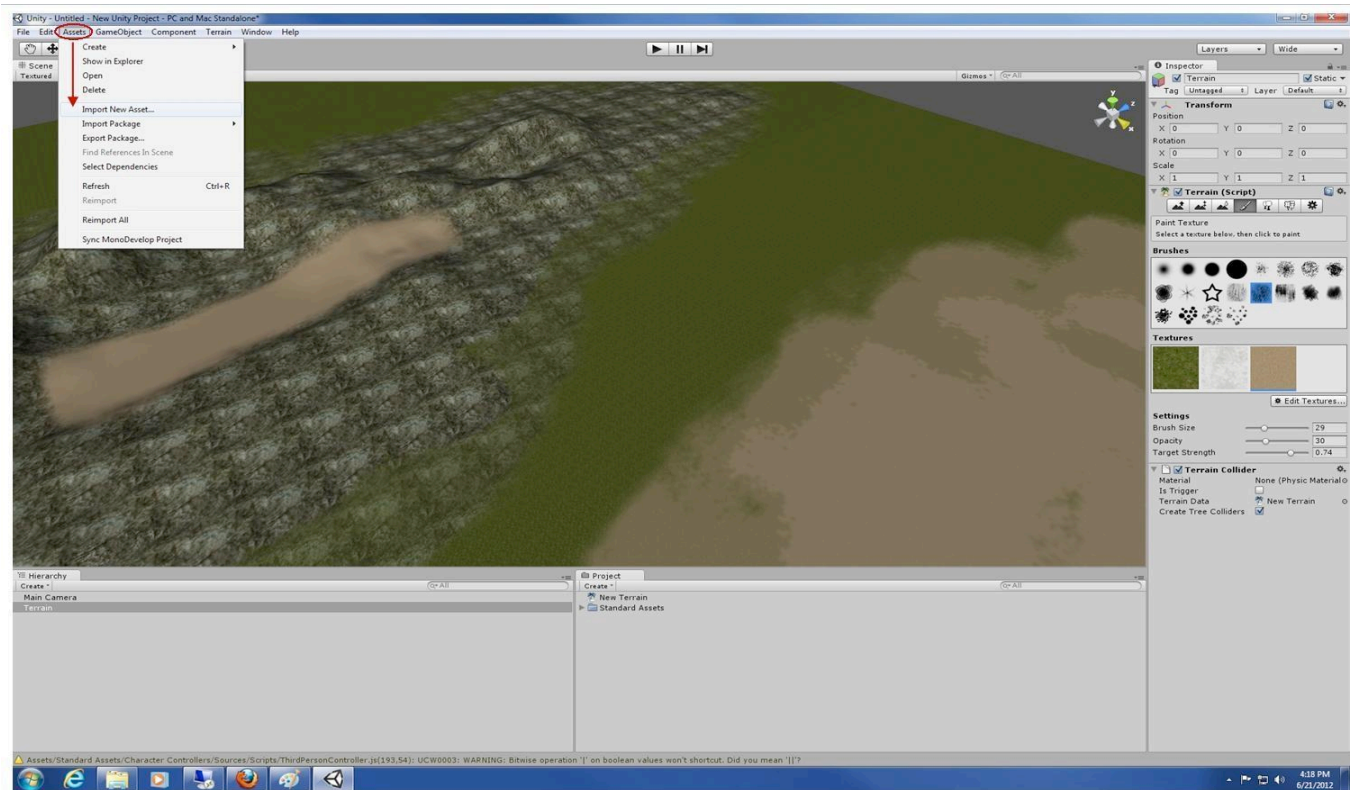


FIGURE 8: MENU NAVIGATION TO IMPORT A NEW ASSET

6. Locate the saved FBX and click Import.
7. The model will load into the project, which may take some time depending on size of the model.
8. If you want to create lightmaps for your model, check the "generate lightmaps" in the inspector and click apply.
9. Drag the FBX model file into the Hierarchy window to add it to the scene. Alternatively, you may also drag the model file into the Scene from Project window.
10. Hit Apply on the popup window saying "Unapplied Import Settings" shown in Figure 21.



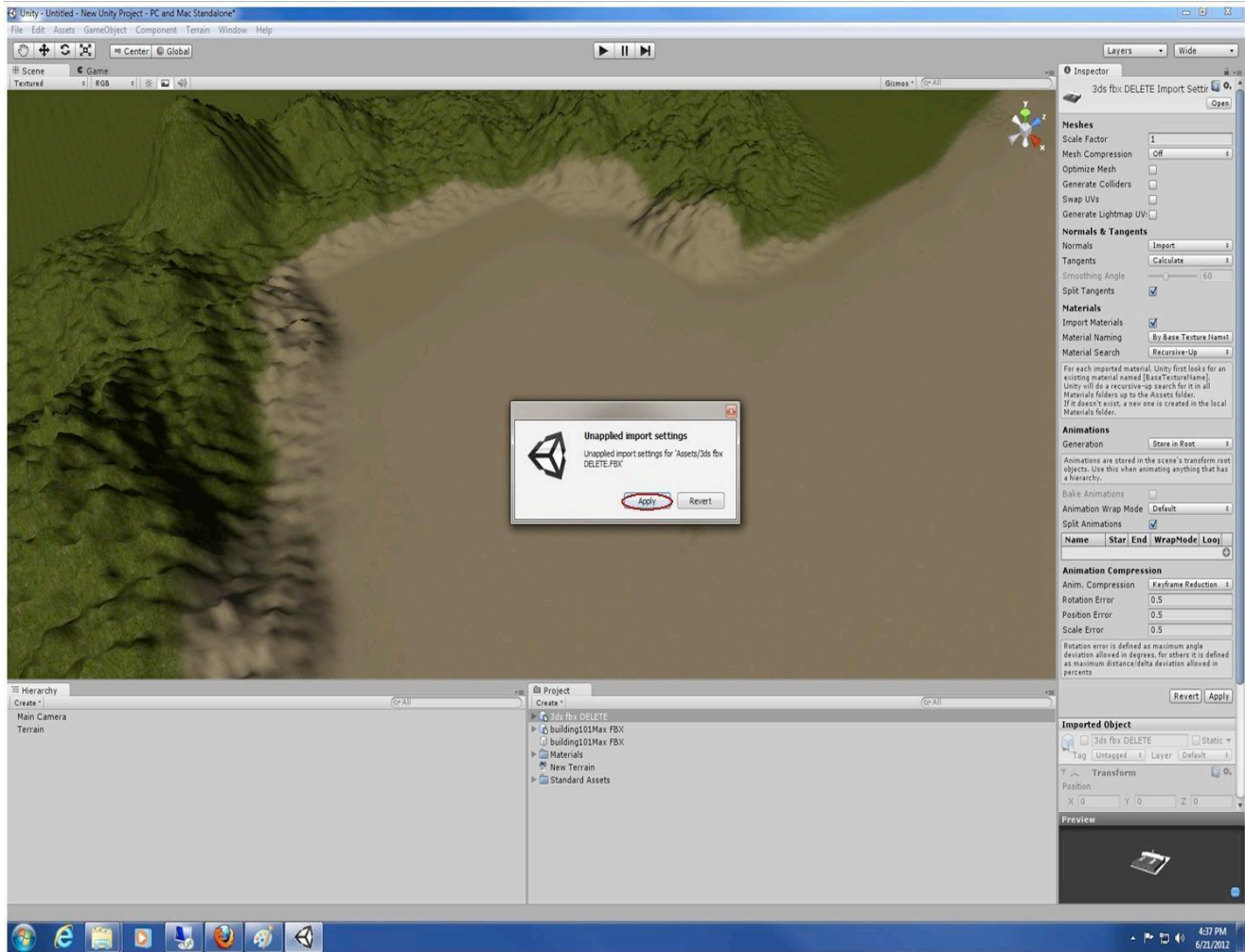


FIGURE 9: APPLYING UNAPPLIED IMPORT SETTINGS TO THE MODEL

11. Model will be imported into the scene, which may take some time depending on size of the model. See Figure 22.



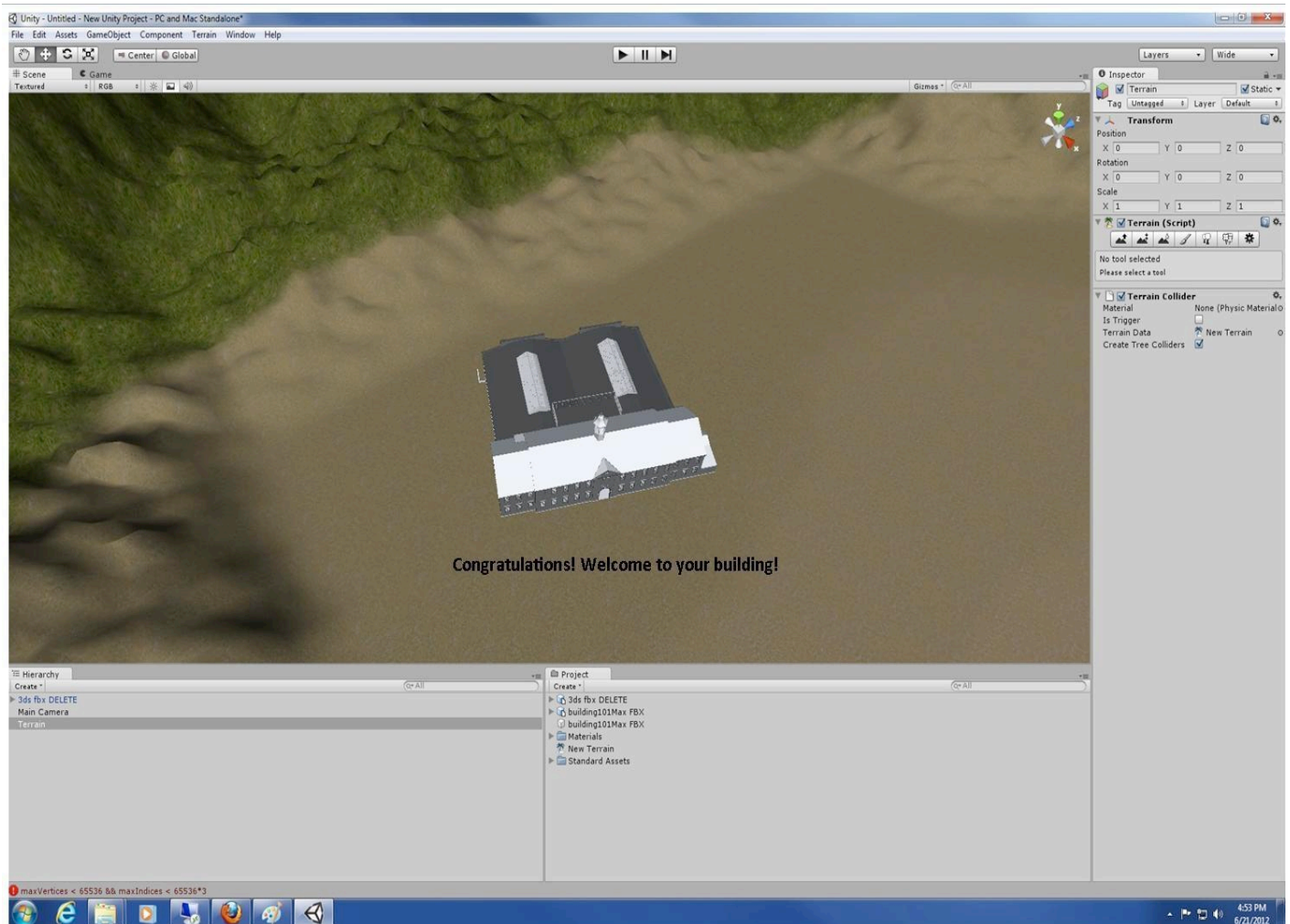


FIGURE 10: FINISHED MODEL IMPORTED

12. Model can now be changed, moved etc. with the same functionality as any other asset.
13. Manually apply textures in Unity: if you did not use the AMC plugin in 3ds max, you can manually apply all the material in Unity. There are several ways to do this. Here I will introduce one quick method. Revit and 3ds max share the same texture library. In Revit FBX, textures are not embedded in the file but stored as reference. This is designed to reduce the size of the FBX file. If you go to the slate material editor in 3ds max and click a scene material, you will see each material is referencing a texture stored in the Autodesk material library folder. Follow the path and locate that folder, import that folder into Unity. Next you only need to go through each scene material in the slate material editor, find out the name of the material and the name of the referenced texture. In Unity project window, search the material name and texture name, and apply the texture to the material.



Document is developed by Penn State CIC research group. Questions or suggestions regarding the workflow can be directed to Yifan Liu (yx15209@psu.edu)

Special thanks to Natasha Beck

